#### 1. POWER OF THE SET OF PRIME NUMBERS:

As a proof of the claim I have made (postulate), I intend to present to you a way to calculate the power of a set of prime numbers, i.e. an algorithm that allows us to determine the number of primes proper within a given numerical range (0, x). This is the so-called "theorem on prime numbers".

Of course, I will base my proof on the equations derived in my innovative scientific work "Distribution of prime numbers".

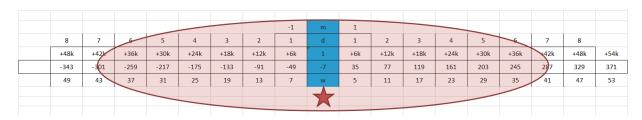


Fig. 4. Generation of multiples—numbers  $u_r$  fo the number  $p_r = 7$ . (w - nth multiples, d i m - coefficients from equation (11)).

The "prime number theorem" defining the power of the set  $\pi(n)$  is a serious problem to this day. The value of the result of this equation is burdened with an error, and its size decreases asymptotically when  $n \to +\infty$ .

$$\pi(n) \approx \frac{n}{\log(n)} \tag{13}$$

To this day, it has not been possible to design a formula that would unambiguously and without error calculate the number of prime numbers in the set of whole numbers. Therefore, my observations can become an innovative way to deal with this issue.

# **ASSUMPTIONS:**

- 1) It is obvious that prime numbers are searched for odd numbers, the sum of which is not divisible by 3, which is unequivocally looking for them among the numbers that are part of the set  $Z_{r}$ .
- 2) The number x is the right edge of the set being examined (0, x >, which we will consider in terms of the number of prime numbers proper.

# **POSTULATE 2:**

If the number x is divided by 5 (the first first proper number of the set  $Z_r$ ) we get the right boundary of the set  $(0, \frac{x}{5})$ , which will contain numbers  $z_r$  affecting the generation of all numbers  $u_r$  in the entire collection space (0, x).

## EXAMPLE 1:

- 1) Let *x* be 77.
- 2) If we divide 77 into 5 we get 15,4.
- 3) We quickly notice that in a set of integers (0.15) there are four numbers  $z_r:\{5.7,11,13\}\in(0.15)$ .
- 4) According to the above postulate, these numbers suffice to determine all numbers  $u_r$  located in the whole space of the set (0, x >.
- 5) Below I present a list of all combinations of numbers  $u_r$  resulting from numbers  $\{5,7,11,13\}$  (products of pairs of numbers  $z_r$ ):

$$5 \times 5 = 25$$
 $5 \times 7 = 35$ 
 $5 \times 11 = 55$ 
 $5 \times 13 = 65$ 
 $7 \times 7 = 49$ 
 $7 \times 11 = 77$ 
 $7 \times 13 = 91$ 
 $11 \times 11 = 121$ 
 $11 \times 13 = 143$ 
 $13 \times 13 = 169$ 
(14)

It is worth noting that all (**in bold**) above the results are exactly a two-element combination with repetitions from the n – element set, in this case a four-element set. It is important to reject mirror combinations, i.e. ab and ba are treated as twin combinations. The formula for the number of two-element combinations from a four-element set is shown below:

$$C_n^k = {k+n-1 \choose k} = \frac{(k+n-1)!}{k! (n-1)!} = \frac{(2+4-1)!}{2! (4-1)!} = 10$$
 (15)

Let's look ...

In the above-mentioned example, we have affect with the number  $z_r$  small sizes. Questions arise as to how subsections 3 and 7 will be solved in case of much larger numbers  $z_r$ .

In this case, I will present you two ways to solve these doubts, and their order will not be accidental, because the below presented mathematical calculator will be a good reference and visualization of theoretical mathematical calculations:

- mathematical calculator (based on the EXCEL program from the MS Office package) using the above-mentioned formulas and theoretical relations;
- theoretical (using mathematical calculations);

#### **MATHEMATICAL CALCULATOR:**

In order to solve the problem related to the power of prime numbers, I used the EXCEL program from the MS Office suite, which according to my person is a great and extremely versatile tool useful not only in the world of mathematics.

In the further part of my research I intend to introduce to you step by step the algorithm used to determine the power of the set of natural numbers:

#### STEP 1.

Let us assume that for the experiment x = 1411.

## STEP 2.

Let's build a numerical table whose elements  $u_r$  are multiples of all numbers  $z_r$  determined in postulate No. 2. This table will therefore have sizes (Figure 5):

- a. height:93
  - ✓ the number of rows in the numeric table should be consistent with the number of numbers  $z_r$  falling within the range  $(0, \frac{x}{5})$ , it means (0; 282,6),
- a. width: 12
  - ✓ the number of columns in the numeric table should be consistent with the number of numbers  $z_r$  falling within the range  $(0, \sqrt{x})$ , it means (0; 37,6),

The color of the			1 *	2 🔻	3 -	4 -	5 +	6 +	7 🔻	8 +	9 +	10 🕶	11 -	12 🔻
11	5	1												
14	7	2	35	77	143	221	323	437	575	725	899	1085	1295	1517
17	11	3	55	91	187	247	391	475	667	775	1015	1147	1435	1591
19														
1.0														
29														
29											1471			
10											1537			
1	31	10	155	245	407	533	731	893	1127	1325	1595	1829	2135	2405
14	35	11	175	259	451	559	799	931	1219	1375	1711	1891	2275	2479
41	37	12	185	287	473	611	833	1007	1265	1475	1769	2015	2345	2627
A														
Main									1403					
Section   Page   Page									1541					
Section   1985   1986   1987   1988   1989														
Section   19			275							1925				0 = 10
Columb   C			295							1975			3115	
Fig.	61	20	305	455	737	923	1241	1463	1817	2075	2465	2759	3185	3515
The color of the	65	21	325	469	781	949	1309	1501	1909	2125	2581		3325	3589
The color of the	67		335	497	803		1343	1577		2225			3395	3737
The color of the														
Page														
Bay														
Beg														
B9														
95   10   10   15   15   15   15   13   15   15   15														
Property														
103   34   505   721   1177   7277   1921   1825   2277   2925   3252   3937   4885   5221   5231   5315   5315   535   763   1243   1255   2023   2290   2875   3175   3799   1124   4795   5134   5109   565   545   791   1255   1247   2575   2325   2921   2375   3573   4390   5005   5255   5311   53   575   3831   1311   222   2239   2249   2325   2325   2327	95		475	679	1111		1819	2071	2599		3451	3751	4375	4699
107   15   539   763   1243   1265   2260   2279   2275   3175   3789   4021   4265   5599   5143   109   36   545   791   126   147   2075   2275   2215   2214   3013   3225   3073   4309   5005   5265   115   38   575   331   3131   125   2219   2249   3259   3425   4031   4433   3077   5513   5514   119   39   595   647   2375   1385   1272   2259   2489   3259   3425   4031   4433   3077   5513   121   127   2259   2489   3259   3475   4405   4619   5285   5587   121   40   605   875   1397   1270   2259   2489   3259   3475   4405   4619   5285   5587   121   40   605   875   1397   1270   2259   2489   3259   3425   40031   4433   3077   5513   121   410   505   875   1397   1270   2239   2461   3239   325   4025   4619   5285   5587   121   40   605   875   1397   1303   2263   2603   3197   3575   4005   4619   5285   5593   125   410														
109														
190														
113														
119   38   575   23   31   333   1425   2159   2469   3026   3425   4031   4433   5072   5513   5514   121   40   603   275   3397   1703   2281   2603   3197   327   4205   4619   5225   5238   121   448   623   638   4371   4272   2229   2491   2227   3225   3229   4291   4681   4232   5809   127   442   635   635   917   3463   4781   2263   2272   3335   3375   4379   4405   5465   5523   131   434   625   533   5377   8463   4781   2263   2272   3335   3375   4379   4405   5465   5673   1331   443   625   5373   5373   5479   5485   5675   6179   1331   443   625   5373   5373   5373   5373   5373   4379   4405   5465   5675   5675   5775														
119														
125					1375									
127	121			875				2603	3197		4205	4619		5735
131														
133														
137														
139														
143														
145					1639			2983		4075				
151	145	48		1043	1661		2669	3059	3749	4175	4901	5363	6125	6623
155														
1577   52   785   1177   1793   2171   2273   3287   4075   4475   5249   5725   6545   7067     161   53   605   1141   1837   2197   2941   3285   4117   4525   5243   5921   6755   7289     167   55   835   1183   1903   2275   3043   3439   4255   4675   5539   5983   6895   7363     169   56   545   1211   1252   3277   3077   3515   4301   4775   5597   6107   6965   7511     173   57   865   1225   1969   2353   3145   3553   4393   4825   5713   6169   7105   7855     175   58   577   1253   1991   2403   3179   3629   4439   4925   5771   6293   7115   7733     179   59   895   1267   2055   2231   3247   3667   4531   4975   5887   6355   7315   7807     181   60   905   1295   2057   2483   3281   3743   4577   5075   5945   6479   7385   7955     187   62   935   1337   2123   2561   3383   3857   4715   5225   6119   6665   7525   6029     187   62   935   1337   2123   2561   3383   3857   4715   5225   6119   6665   7727   7735     193   64   965   1379   2189   2639   3485   3971   4853   5375   6249   6491   7935   6727   7735   8251     199   66   995   1422   2255   2255   2273   3587   4095   4945   5425   6409   6913   7945   8473     199   66   995   1421   2255   2255   22665   3553   4009   4945   5425   6409   6913   7945   8473     199   66   995   1422   2255   2255   2717   3587   4095   6991   5525   6677   7735   8251     203   67   1015   1433   2299   2743   3655   4123   5255   6677   7735   8251     203   67   1015   1433   2299   2743   3655   4123   5255   6677   7735   8251     204   68   1025   1463   2231   2795   3689   4495   5425   5425   8438     209   69   1048   1477   2365   2221   3757   4237   5221   5775   6583   7099   8155   8695     221   77   1085   1545   2247   2377   3965   4695   5975   6681   7707   7785   8355     221   77   108   1541   1589   2519   3029   3995   4541   5543   6255   7813   7967   8485     221   74   108   1541   1589   2519   3029   3995   4541   5543   6225   7803   8715   9905     223   74   1165   1631   2255   3133   4165   649														
161														
163														
167														
173   57					1903		3043							
175   58   876   1253   1991   2405   3179   3629   4439   4925   5771   6292   7175   7731   773   774   773	169	56	845	1211	1925	2327	3077	3515	4301	4775	5597	6107	6965	7511
179	173		865	1225	1969	2353	3145	3553	4393	4825	5713	6169	7105	7585
181														
185														
187			905	1300					45//					8020
191			935	1337					4715				7595	8177
193													7735	
199			965	1379		2639	3485				6293	6851	7805	
203												-		
205         68         1025         1463         2321         2795         3689         4199         5129         5675         6641         7223         8225         8843           209         69         1045         1477         2365         2821         3757         4237         5221         5725         6757         7285         8365         8917           211         70         1055         1505         2387         2872         3791         4313         5267         5825         6815         7409         8435         9065           215         71         1078         1519         2431         2899         3859         4351         5359         5875         6931         7471         8575         9139           217         72         1085         1547         2453         2951         3893         4427         5405         5975         6989         7595         8645         9287           221         73         1105         1561         2497         2977         3961         4465         5497         6025         7105         7657         8785         9361           222         75         1135         1603												_		
209   69														
211   70														
215														
217         72         108S         1547         2453         2951         3893         4427         5405         5975         6989         7595         8645         9287           221         73         1105         1561         2497         2977         3961         4465         5497         6025         7105         7878         9361           223         74         1115         1589         2519         3029         3995         4541         5543         6125         7163         7781         8855         9809           227         75         1135         1603         2563         3055         4063         4579         5635         6175         7279         7843         8995         9583           229         76         1145         1631         2585         3107         4097         4655         5681         6275         7337         7967         9065         9731           233         77         1165         1645         2629         3133         4165         4693         5773         6325         7453         8029         9205         9805           235         78         1175         1673         2651														
221         73         110S         1561         2497         2977         3961         4465         5497         6025         710S         7657         8785         9361           223         74         1115         1589         2519         3029         3995         4541         5543         6125         7163         7781         8855         9509           227         75         1135         1603         2563         3055         4063         4579         5635         6175         7279         7843         8995         9805           229         76         1145         1631         2585         3107         4097         4655         5681         6275         7337         7967         9065         9731           233         77         1165         1645         2629         3133         4165         4693         5773         6325         7453         8029         9205         9805           235         78         1175         1168         1667         2695         3211         4267         4807         5911         6425         7511         8153         92275         9953           239         79         1195														
227         75         1135         1603         2563         3055         4063         4579         5635         6175         7279         7843         8995         9583           229         76         1145         1631         2585         3107         4097         4655         5681         6275         7337         7967         9065         9731           233         77         1165         1645         2629         3133         4165         4693         5773         6325         7453         8029         9205         9805           235         78         1175         1673         2651         3185         4199         4769         5819         6425         7511         8153         9275         9953           239         79         1195         1687         2695         3211         4267         4807         5911         6475         7627         8215         9415         10027           241         80         1205         1715         2717         3263         4301         4883         5957         6575         7681         8339         9485         10175           245         81         1225         1729		73												
229         76         1145         1631         2585         3107         4097         4655         5681         6275         7337         7967         9065         9731           233         77         1165         1645         2629         3133         4165         4693         5773         6325         7453         8029         9205         9805           235         78         1175         1673         2651         3185         4199         4769         5819         6425         7511         813         9275         9953           239         79         1195         1687         2695         3211         4267         4807         5911         6475         7627         8215         9415         10027           241         80         1205         1715         2717         3263         4301         4883         5957         6575         7685         8339         9485         10175           245         81         1225         1729         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1235         1777									5543					
233         77         1165         1645         2629         3133         4165         4693         5773         6325         7453         8029         9205         9805           235         78         1175         1673         2651         3185         4199         4769         5819         6425         7511         8153         9275         9953           239         79         1195         1687         2695         3211         4267         4807         5911         6475         7627         8215         9415         10027           241         80         1205         1715         2717         3263         4301         4883         5957         6575         7685         8339         9485         10175           245         81         1225         1729         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1235         1757         783         3341         4403         4997         6095         6725         7851         8401         9625         10249           251         83         1255         1771									5635					
235         78         1175         1673         2651         3185         4199         4769         5819         6425         7511         8153         9275         9953           239         79         1195         1687         2695         3211         4267         4807         5911         6475         7627         8215         9415         10027           241         80         1205         1715         2717         3263         4301         4883         5957         6575         7685         8339         9485         10175           245         81         1225         1729         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1235         1757         2783         3341         4403         4997         6095         6725         7859         8525         9695         10397           251         83         1255         1771         2827         3367         4471         5035         6187         6775         7975         8587         9835         10471           253         384         1265         1799														
239         79         1195         1687         2695         3211         4267         4807         5911         6475         7627         8215         9415         10027           241         80         1205         1715         2717         3263         4301         4883         5957         6575         7685         8339         9485         10175           245         81         1225         1779         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1225         1777         2783         3341         4403         4997         6095         6725         7859         8525         9695         10397           251         83         1255         1771         2827         3367         4471         5035         6187         6775         7975         8587         9835         10471           253         84         1265         1799         2849         3419         4505         5111         6233         6875         8033         8711         9905         0           257         85         1285         1813														
241         80         1205         1715         2717         3263         4301         4883         5957         6575         7685         8339         9485         10175           245         81         1225         1729         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1235         1757         2783         3341         4403         4997         6095         6725         7851         8401         9625         10397           251         83         1255         1771         2827         3367         4471         5035         6187         6775         7975         8587         9835         10471           253         84         1265         1799         2849         3419         4505         5111         6233         6875         8033         8711         9905         0           257         85         1285         1811         2915         3449         45073         5149         6275         8149         8773         0         0           269         86         1295         1841         2915 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>														
245         81         1225         1729         2761         3289         4369         4921         6049         6625         7801         8401         9625         10249           247         82         1235         1757         2783         3341         4403         4997         6095         6725         7859         8525         9695         10397           251         83         1255         1771         2827         3367         4471         5035         6187         6775         7975         8587         9835         10471           253         84         1265         1799         2849         3419         4505         5111         6233         6875         8033         8711         9905         0           257         85         1285         1813         2893         3445         4573         5149         6325         6925         8149         8773         0         0           263         87         1315         1855         2959         3523         4675         5263         6463         7075         0         0         0         0         0         0         0         0         0         0         0<														
247         82         1235         1757         2783         3341         4403         4997         6095         6725         7859         8525         9695         10397           251         83         1255         1771         2827         3367         4471         5035         6187         6775         7975         8587         9835         10471           253         84         1265         1799         2849         3419         4505         5111         6233         6875         8033         8711         9905         0           257         85         1285         1813         2893         3445         4573         5149         6225         6925         8149         8773         0         0           259         86         1295         1841         2915         3497         4607         5225         6371         7025         8207         0									6049					
253         84         1265         1799         2849         3419         4505         5111         6233         6875         8033         8711         9905         0           257         85         1285         1813         2893         3445         4573         5149         6325         6925         8149         8773         0         <						3341		4997	6095					
257         85         1285         1813         2893         3445         4573         5149         6325         6925         8149         8773         0         0           259         86         1295         1841         2915         3497         4607         5225         6371         7025         8207         0 </td <td></td> <td>7975</td> <td></td> <td></td> <td></td>											7975			
259         86         1295         1841         2915         3497         4607         5225         6371         7025         8207         0         0         0           263         87         1315         1885         2959         3523         4675         5263         6463         7075         0														
263         87         1315         1855         2959         3523         4675         5263         6463         7075         0         0         0         0           265         88         1325         1883         2981         3575         4709         5339         6509         0														
265         88         1325         1883         2981         3575         4709         5339         6509         0         0         0         0         0           269         89         1345         1897         3025         3601         4777         5377         0<														
269         89         1345         1897         3025         3601         4777         5377         0         0         0         0         0         0           271         90         1355         1925         3047         3653         4811         0														
271         90         1355         1925         3047         3653         4811         0         0         0         0         0         0           275         91         1375         1939         3091         3679         0														
275         91         1375         1939         3091         3679         0														
281 <b>93</b> 1405 1981 0 0 0 0 0 0 0 0 0 0		91	1375	1939			0	0	0		0	0		0
$T$ 1 1 $\cdots$ $T$ 1 $T$		93	1405	1981	0	0	0	0		0		0	0	0

Fig. 5. Tabular summary of numbers  $u_r$  generated from numbers  $z_r$  - postulate No 2.

- with red in the tabular summary of numbers  $u_r$  (Figure 5.), check the repeated numbers being the results of a two-element combination with the repetitions from the numbers  $z_r$  in the range  $(0, \frac{x}{5})$  and affecting the generation of numbers  $u_r$  in the range (0, x);
- for this purpose, let us use conditional formatting (one of the interesting functions of the EXCEL program) to capture duplicate values of the number  $u_r$ ;
- please note that in the first row of the table there are only numbers  $z_r$  raised to the square. Because in the tabular summary we do not capture the results of the two-element combinations being their mirror reflection in the record (reminder: the ab = ba combination);
- the idea of tabular summary of numbers  $u_r$  (Figure 6a, 6b) presents schemes:

	а	b	С	d	е	f	g	h	i	j
а	aa	ab	ac	ad	ae	af	ag	ah	ai	aj
b	ba	bb	bc	bd	be	bf	bg	bh	bi	bj
С	ca	cb	СС	cd	ce	cf	cg	ch	ci	cj
d	da	db	dc	dd	de	df	dg	dh	di	dj
е	ea	eb	dc	ed	ee	ef	eg	eh	ei	ej
f	fa	fb	fc	fd	fe	ff	fg	fh	fi	fj
g	ga	gb	gc	gd	ge	gf	gg	gh	gi	gj
h	ha	hb	hc	hd	he	hf	hg	hh	hi	hj
i	ia	ib	ic	id	ie	if	ig	ih	ii	ij
j	ja	jb	jc	jd	je	jf	jg	jh	ji	jj

Fig. 6a. The idea tabular summary of number  $u_r$  - postulate No. 2. (tabular sets of numbers  $u_r$  represent only the above-mentioned black boxes)

	а	b	С	d	е	f	g	h	i	j
а	aa	bb	СС	dd	ee	ff	gg	hh	ii	jj
b	ba	cb	dc	ed	fe	gf	hg	ih	ji	0
С	ca	db	dc	fd	ge	hf	ig	jh	0	0
d	da	eb	fc	gd	he	if	jg	0	0	0
е	ea	fb	gc	hd	ie	jf	0	0	0	0
f	fa	gb	hc	id	je	0	0	0	0	0
g	ga	hb	ic	jd	0	0	0	0	0	0
h	ha	ib	jc	0	0	0	0	0	0	0
i	ia	jb	0	0	0	0	0	0	0	0
j	ja	0	0	0	0	0	0	0	0	0

Fig. 6b. The idea tabular summary of number  $u_r$  - postulate No. 2. (after changing cell values - field conversion)

# STEP 3.

Marking (underlining) only those values of numbers  $u_r$ , which are within the tested range (0, x > .

- for this purpose, let's also use conditional formatting to mark values of numbers  $u_r$  less or equal to x.

	~	1 -	2 -	3 -	4 -	5 -	6 -	7 -	8 -	9 +	10 🔻	11 -	12 🔻
5	1	25	49	121	169	289	361	529	625	841	961	1225	1369
7	3	35 55	77 91	143 187	221 247	323 391	437 475	575 667	725 775	899 1015	1085 1147	1295 1435	1517 1591
13	4	65	119	209	299	425	551	713	875	1073	1271	1505	1739
17	5	85	133	253	325	493	589	805	925	1189	1333	1645	1813
19	6	95	161	275	377	527	665	851	1025	1247	1457	1715	1961
23 25	7	115 125	175 203	319 341	403 455	595 629	703 779	943 989	1075 1175	1363 1421	1519 1643	1855 1925	2035 2183
29	8 9	145	217	385	481	629	817	1081	1225	1537	1705	2065	2257
31	10	155	245	407	533	731	893	1127	1325	1595	1829	2135	2405
35	11	175	259	451	559	799	931	1219	1375	1711	1891	2275	2479
37	12	185	287	473	611	833	1007	1265	1475	1769	2015	2345	2627
41	13 14	205 215	301 329	517 539	637 689	901 935	1045 1121	1357 1403	1525 1625	1885 1943	2077 2201	2485 2555	2701 2849
47	15	235	343	583	715	1003	1159	1495	1675	2059	2263	2695	2923
49	16	245	371	605	767	1037	1235	1541	1775	2117	2387	2765	3071
53	17	265	385	649	793	1105	1273	1633	1825	2233	2449	2905	3145
55 59	18 19	275 295	413 427	671 715	845 871	1139 1207	1349 1387	1679 1771	1925 1975	2291 2407	2573 2635	2975 3115	3293 3367
61	20	305	455	737	923	1241	1463	1817	2075	2465	2759	3185	3515
65	21	325	469	781	949	1309	1501	1909	2125	2581	2821	3325	3589
67	22	335	497	803	1001	1343	1577	1955	2225	2639	2945	3395	3737
71	23 24	355	511 539	847	1027	1411	1615	2047	2275	2755	3007	3535	3811
73 77	25	365 385	553	869 913	1079 1105	1445 1513	1691 1729	2093 2185	2375 2425	2813 2929	3131 3193	3605 3745	3959 4033
79	26	395	581	935	1157	1547	1805	2231	2525	2987	3317	3815	4181
83	27	415	595	979	1183	1615	1843	2323	2575	3103	3379	3955	4255
85	28	425	623	1001	1235	1649	1919	2369	2675	3161	3503	4025	4403
89 91	29 30	445 455	637 665	1045 1067	1261 1313	1717 1751	1957 2033	2461 2507	2725 2825	3277 3335	3565 3689	4165 4235	4477 4625
95	31	455	679	1111	1313	1819	2033	2507	2825	3451	3751	4235	4625
97	32	485	707	1133	1391	1853	2147	2645	2975	3509	3875	4445	4847
101	33	505	721	1177	1417	1921	2185	2737	3025	3625	3937	4585	4921
103 107	34 35	515 535	749 763	1199 1243	1469 1495	1955 2023	2261 2299	2783 2875	3125 3175	3683 3799	4061 4123	4655 4795	5069 5143
107	36	545	763	1243	1547	2023	2375	2921	3275	3799	4123	4865	5291
113	37	565	805	1309	1573	2125	2413	3013	3325	3973	4309	5005	5365
115	38	575	833	1331	1625	2159	2489	3059	3425	4031	4433	5075	5513
119	39	595	847	1375	1651	2227	2527	3151	3475	4147	4495	5215	5587
121 125	40 41	605 625	875 889	1397 1441	1703 1729	2261 2329	2603 2641	3197 3289	3575 3625	4205 4321	4619 4681	5285 5425	5735 5809
127	42	635	917	1463	1781	2363	2717	3335	3725	4379	4805	5495	5957
131	43	655	931	1507	1807	2431	2755	3427	3775	4495	4867	5635	6031
133	44	665	959	1529	1859	2465	2831	3473	3875	4553	4991	5705	6179
137 139	45 46	685 695	973 1001	1573 1595	1885 1937	2533 2567	2869 2945	3565 3611	3925 4025	4669 4727	5053 5177	5845 5915	6253 6401
143	47	715	1001	1639	1963	2635	2943	3703	4025	4843	5239	6055	6475
145	48	725	1043	1661	2015	2669	3059	3749	4175	4901	5363	6125	6623
149	49	745	1057	1705	2041	2737	3097	3841	4225	5017	5425	6265	6697
151	50	755	1085	1727	2093	2771	3173	3887	4325	5075	5549	6335	6845
155 157	51 52	775 785	1099 1127	1771 1793	2119 2171	2839 2873	3211 3287	3979 4025	4375 4475	5191 5249	5611 5735	6475 6545	6919 7067
161	53	805	1141	1837	2197	2941	3325	4117	4525	5365	5797	6685	7141
163	54	815	1169	1859	2249	2975	3401	4163	4625	5423	5921	6755	7289
167	55	835	1183	1903	2275	3043	3439	4255	4675	5539	5983	6895	7363
169 173	56 57	845 865	1211 1225	1925 1969	2327 2353	3077 3145	3515 3553	4301 4393	4775 4825	5597 5713	6107 6169	6965 7105	7511 7585
175	58	875	1253	1991	2405	3179	3629	4439	4925	5771	6293	7175	7733
179	59	895	1267	2035	2431	3247	3667	4531	4975	5887	6355	7315	7807
181	60	905	1295	2057	2483	3281	3743	4577	5075	5945	6479	7385	7955
185 187	61 62	925 935	1309 1337	2101 2123	2509 2561	3349 3383	3781 3857	4669 4715	5125 5225	6061 6119	6541 6665	7525 7595	8029 8177
191	63	955	1357	2123	2587	3451	3895	4807	5275	6235	6727	7735	8251
193	64	965	1379	2189	2639	3485	3971	4853	5375	6293	6851	7805	8399
197	65	985	1393	2233	2665	3553	4009	4945	5425	6409	6913	7945	8473
199 203	66 67	995 1015	1421 1435	2255 2299	2717 2743	3587 3655	4085 4123	4991 5083	5525 5575	6467 6583	7037 7099	8015 8155	8621 8695
205	68	1025	1463	2321	2795	3689	4199	5129	5675	6641	7223	8225	8843
209	69	1045	1477	2365	2821	3757	4237	5221	5725	6757	7285	8365	8917
211	70	1055	1505	2387	2873	3791	4313	5267	5825	6815	7409	8435	9065
215	71 72	1075 1085	1519	2431	2899	3859 3893	4351 4427	5359	5875 5975	6931	7471 7595	8575 8645	9139 9287
217 221	72 73	1085	1547 1561	2453 2497	2951 2977	3961	4427	5405 5497	5975 6025	6989 7105	7595 7657	8785	9287
223	74	1115	1589	2519	3029	3995	4541	5543	6125	7163	7781	8855	9509
227	75	1135	1603	2563	3055	4063	4579	5635	6175	7279	7843	8995	9583
229	76	1145	1631	2585	3107	4097	4655	5681	6275	7337	7967	9065	9731
233 235	77 78	1165 1175	1645 1673	2629 2651	3133 3185	4165 4199	4693 4769	5773 5819	6325 6425	7453 7511	8029 8153	9205 9275	9805 9953
239	79	1195	1687	2695	3211	4267	4807	5911	6475	7627	8215	9415	10027
241	80	1205	1715	2717	3263	4301	4883	5957	6575	7685	8339	9485	10175
245	81	1225	1729	2761	3289	4369	4921	6049	6625	7801	8401	9625	10249
247 251	82 83	1235 1255	1757 1771	2783 2827	3341 3367	4403 4471	4997 5035	6095 6187	6725 6775	7859 7975	8525 8587	9695 9835	10397 10471
251	83	1265	1771	2849	3419	4505	5111	6233	6875	8033	8711	9905	0
257	85	1285	1813	2893	3445	4573	5149	6325	6925	8149	8773	0	0
259	86	1295	1841	2915	3497	4607	5225	6371	7025	8207	0	0	0
263	87 88	1315 1325	1855	2959	3523	4675 4709	5263	6463	7075	0	0	0	0
265 269	88 89	1325 1345	1883 1897	2981 3025	3575 3601	4709 4777	5339 5377	6509 0	0	0	0	0	0
271	90	1355	1925	3047	3653	4811	0	0	0	0	0	0	0
275	91	1375	1939	3091	3679	0	0	0	0	0	0	0	0
277	92	1385	1967	3113	0	0	0	0	0	0	0	0	0
281	93	1405	1981	0	0	0	0	0	0	0	0	0	0

Fig. 7. Tabular summary of numbers  $u_r$  smaller than the number x.

- the numbers 0 seen at the bottom of the table are caused by the offsets of the rows of subsequent columns in accordance with the illustration of the idea of tabular summary of number  $u_r$  (Fig. 6.);
- comparing two figures 5 and 7, we come to the conclusion that among the generated numbers  $u_r$  in the range (0, x > there are still repeating values.

## STEP 4.

Determination of the multiplicity of repetitions of the numbers  $u_r$  in the interval (0, x >;

- using very useful formulas of the EXCEL program we are able to count the duplication times (repetitions) of individual values of the number  $u_r$  (see. Fig. 9.);
- result:

ILOŚĆ	WKR	Zr
206	1	206
48	2	24
54	3	18
4	4	1
0	5	0
0	6	0
0	7	0
0	8	0
0	9	0
312	Ur	249

Fig. 8. The multiplicity of the repetitions of generated  $u_r$  numbers (results).

- according to the table in Fig. 8. and the postulate No 2 from the numbers  $z_r$  falling within the range  $(0, \frac{x}{5})$  we are able to generate in the numerical range (0, x) up to 312 numbers  $u_r$ , with the proviso that:
  - 48 numbers  $u_r$  are repeated twice;
  - 54 numbers  $u_r$  are repeated three times;
  - 4 numbers  $u_r$  r are repeated four times;
- if the number of repeated numbers of each group divide by their multiplicity, we will get an interesting set of numbers  $u_r$ ;
- finally we receive information that the number of generated and different numbers  $u_r$  (i.e. without repetitions) in the range (0, x > is exactly 249;

## STEP 5.

Calculation of the power of a set of prime numbers, which at this moment becomes the proverbial "bread roll", because it is enough to determine which number according to the formula (9) is the number x and subtract from it the number 249 received above (see formula 12);

							_	_						
7	-	-		2 🔻	3 🕶	4 ~	5 ~	6 -			9 -	10 -		
11														1
13													3	
17	11	3	1	1	1	1	1	2	1	2	3	1		
19	13	4	1	1	1	1	2	1	1	3	1	1		
19														
1														
29														
29											-			
38														_
35														
37														
43			2	1	1	1		2		3				
43	37	12	1	1	1	1	2	1	3					
43	41	13	1	1	1	2	1	3	1					
49														
49														
Signature   Sign														
Section   Sect														
59														
66	55		2	1	1	2	1	1						
65	59	19	1	1	3	1	1	1						
07	61	20	1	3	1	1	1							
07	65	21	2	1	1	1	3							
T1														
73														
77							-							
The color of the												-	-	
88         27         1         3         1         2         8         89         79         1         2         3         1         9         90         1         2         3         1 <th></th>														
88         28         2         1         3         3         1         1         91         30         3         3         1         1         1         95         31         2         1 </th <th></th>														
Beg														
Beg	85			1										$\Box$
95														
95														
97   32														
101   33														$\overline{}$
100						1						<del>                                     </del>	<del>                                     </del>	$\vdash$
107												-		
100													1	igwdown
113   37														
115														
119	113	37	1	3	3									
119	115	38	2	2										
121														
125														
127   42					1									
131														
133			1	1										
137	131	43	1	2										
137	133	44	3	1										
139     46     1     3        143     47     3     3        149     49     1     1        151     50     1     3        155     51     2     1        157     52     1     2        161     53     3     1        163     54     1     1        169     56     2     1        173     57     1     4        173     57     1     4        179     59     1     1        181     60     1     3        187     62     3     1        191     63     1     1        193     64     1     1        197     65     1     1        191     63     1     1        192     63     1     1        193     64     1     1        205     68     2         209     69 <td< th=""><th></th><th>45</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>		45												
143     47     3     3       145     48     2     1       149     49     1     1       151     50     1     3       155     51     2     1       167     52     1     2       168     54     1     1       167     55     1     2       169     56     2     1       173     57     1     4       175     58     3     1       178     58     3     1       181     60     1     3       185     61     2     3       187     62     3     1       191     63     1     1       197     65     1     1       199     66     1     1       199     65     1     1       199     66     1     1       199     65     1     1       205     68     2     2       209     69     3     3       211     70     1       221     73     3       222     75     1       221     73     3 <th></th>														
146       48       2       1         149       49       1       1         151       50       1       3         155       51       2       1         157       52       1       2         161       53       3       1         163       54       1       1         167       55       1       2         173       57       1       4         175       58       3       1         176       55       1       2         177       58       3       1         179       59       1       1         181       60       1       3         187       62       3       1         191       63       1       1         192       64       1       1         193       64       1       1         199       66       1       1         205       68       2       2         209       69       3       2         217       72       3       2         221       73 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>														
149     49     1     1       151     50     1     3       155     51     2     1       161     33     3     1       163     54     1     1       167     55     1     2       169     56     2     1       173     57     1     4       175     58     3     1       177     59     1     1       181     60     1     3       185     61     2     3       187     62     3     1       191     63     1     1       193     64     1     1       199     66     1     1       199     66     1     1       203     67     3     3       205     68     2       209     69     3     3       221     72     3     3       221     73     3     3       222     75     1     1       222     75     1     1       223     74     1     1       224     80     1     1       223 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>														
151														
155														
157				3										
161         53         3         1         1         163         54         1         1         1         1         1         169         55         1         2         1	155	51	2	1										
161         53         3         1         1         163         54         1         1         1         1         1         169         55         1         2         1	157	52	1	2										
163         54         1         1         167         55         1         2         1         169         56         2         1         173         57         1         4         1         1         175         58         3         1														
167														
169														
173														-
175														
179														
181     60     1     3       187     62     3     1       191     63     1     1       193     64     1     1       199     66     1       203     67     3       205     68     2       209     69     3       211     70     1       215     71     2       221     73     3       223     74     1       227     75     1       233     77     1       233     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       263     87     1       265     88     2       269     89     1       277     90     1       277     92     1       281     93     1														
185	179	59	1	1										
185         61         2         3         1           187         62         3         1         1           193         64         1         1         1           197         65         1         1         1           203         67         3         3         1           205         68         2         1         1           209         69         3         1         1           211         70         1         1         1           217         72         3         1         1           221         73         3         1         1           221         73         3         1         1           221         73         3         1         1           221         73         3         1         1           221         75         1         1         1           223         74         1         1         1           229         76         1         1         1           233         77         1         1         1           241         80	181	60	1	3										
187       62       3       1         191       63       1       1         193       64       1       1         199       65       1       1         199       66       1       1         203       67       3       3         205       68       2       2         209       69       3       3         211       70       1       1         217       72       3       3         221       73       3       3         221       73       3       3         223       74       1       1         227       75       1       1         229       76       1       1         233       77       1       1         234       80       1       1         241       80       1       1         244       80       1       1         245       81       4       4         247       82       3       3         257       85       1       1         258       86 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>														
191 63 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1														
193														
197         65         1         1         199         66         1         1         199         66         1														$\vdash$
199 66 1														$\vdash$
203 67 3				4										$\vdash$
205												<b> </b>		$\vdash$
209     69     3       211     70     1       215     71     2       217     72     3       221     73     3       223     74     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       255     85     1       259     86     3       263     87     1       271     90     1       275     91     3       277     92     1       281     93     1												-	-	$\vdash$
211     70     1       215     71     2       217     72     3       221     73     3       223     74     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       271     90     1       275     91     3       277     92     1       281     93     1														
215         71         2           217         72         3           221         73         3           223         74         1           227         75         1           229         76         1           233         77         1           235         78         2           239         79         1           241         80         1           245         81         4           247         82         3           251         83         1           253         84         3           257         85         1           259         86         3           263         87         1           265         88         2           269         89         1           271         90         1           277         92         1           281         93         1														
217														
221     73     3       223     74     1       227     75     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
221     73     3       223     74     1       227     75     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1	217	72	3											
223     74     1       227     75     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
227     75     1       229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     33     1       253     34     3       257     85     1       259     86     3       263     87     1       265     88     2       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
229     76     1       233     77     1       235     78     2       239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       265     88     2       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														$\vdash$
233 77 1														$\vdash$
235												-	-	$\vdash$
239     79     1       241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       265     88     2       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
241     80     1       245     81     4       247     82     3       251     83     1       253     84     3       257     85     1       259     86     3       263     87     1       265     88     2       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														igsquare
245 81 4														
245 81 4														
247 82 3														
251 83 1														$\vdash$
253 84 3														$\vdash$
257												-	1	
259												-	1	
263 87 1														
263 87 1	259	86	3											
265     88     2       269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
269     89     1       271     90     1       275     91     3       277     92     1       281     93     1														
271     90     1       275     91     3       277     92     1       281     93     1														<del></del>
275     91     3       277     92     1       281     93     1												-	-	$\vdash$
277 92 1 281 93 1														
281 93 1														
	277		1											
	281	93	1											

Fig.9. Multiplicity of duplicate values of numbers  $u_r$  less than x.

$$z_{r_k} = O_r + 6\sum_{1}^{k} (-1)^{k+1}k$$

$$z_{r_k} = 1411$$

$$k = 470$$
(9)

- for those who still accept the number  $t_r$  for the proper prime numbers - add the number two to the result obtained:

$$Z_r - U_r + T_r = P_r$$

$$470 - 249 + T_r = 211 + T_r$$

$$\pi(1411) = 211 + T_r$$
(12)

## **MATHEMATICAL CALCULATIONS:**

# REFERENCE TO STEP 2.

In order to resolve item 3 from example No. 1, the number of numbers  $z_r$  included in the set should be determined by using the formula  $(0, \frac{x}{5})$ :

$$n(Z_{r_i}) = \left[\frac{x-5}{30}\right] + \left[\frac{x+5}{30}\right] \tag{16}$$

— where:

o  $n(Z_{r_i})$  — power of the set  $Z_{r_i}$ ;
o i — (auxiliary record)
index informing about the number of  $z_r$  in the set  $(0, \frac{x}{5})$ the value of the index is synonymous with the table height;
o [] — means the result trait (integer part) used for next activities;

The above result of the amount  $z_{r_i}$  is at the same time the height (indicates the number of rows) of the tabular summary of the number  $u_r$  (Fig.5.).

The width (number of columns) of the tabular summary of number  $u_r$  (Fig.5.) is able to be determined using a very similar formula:

$$n\left(Z_{r_j}\right) = \left\lceil \frac{\left\lceil \sqrt{x}\right\rceil - 1}{6} \right\rceil + \left\lceil \frac{\left\lceil \sqrt{x}\right\rceil + 1}{6} \right\rceil \tag{17}$$

— where:

 $\circ$   $n(Z_{r_j})$ — power of the set  $Z_{r_j}$ ;

o *j* — (auxiliary record)

index informing about the number of  $z_r$  in the set  $(0, \sqrt{x})$ , the value of the index is synonymous with the table width;

[] means the result trait (integer part) used for next activities;

## **EXAMPLE 2:**

# Table's height:

- 1) Let x be 1411.
- 2) If we set 1411 under the formula 16 we get  $93 number of numbers z_{r_i} = number of$ rows.
- 3) If the numbers from 1 to 93 are substituted by the formula (9), then we obtain the values of all numbers  $z_{r_i}$  of the set (0,282,2 >, where the largest is  $z_{r_{93}} = 281$ .

#### Table's width:

- 1) If we set 1411 under the formula 17 we get  $12 number of numbers z_{r_i} = numer of$ columns.
- 2) If the numbers from 1 to 12 are substituted by the formula (9), then we obtain the values of all numbers  $z_{r_i}$  of the set (0; 37,56 >, where the largest is  $z_{r_{12}} = 37$ .

## REFERENCE TO STEP 3.

The formula for calculating the total number of numbers  $u_r$  being a numerical combination (Fig. 7.) smaller than the numer x is a combination of three formulas: 9, 16 i 17:

$$n(U_{r_k}) = \sum_{j=1}^{n(z_{r_j})} \left[ \frac{x - |z_{r_j}|}{6|z_{r_j}|} \right] + \left[ \frac{x + |z_{r_j}|}{6|z_{r_j}|} \right] - (j-1)$$
 (18)

— gdzie:

 $\begin{array}{cccc} \circ & n(U_{r_k}) & & - & \text{power of the set } U_{r_k}; \\ \circ & n\left(Z_{r_j}\right) & & - & \text{power of the set } Z_{r_j} \text{ according to formula 17.} \end{array}$ 

o [] — means the result trait (integer part) used for next activities;

 $\circ$   $z_{r_j}$  — individual numbers  $z_r$  with the index above interval j;  $\circ$  j — ordinal number of the number  $z_{r_j}$   $(j \in C)$ ;

## REFERENCE TO STEP 4.

Dispose of the multiplicity of repetitions of the numbers  $u_r$  constituting the numerical combination (Fig. 7.). For this purpose, we can use the following general formula of the set  $U_r$ consisting of the value of the function  $f(z_{r_i}z_{r_i})$ :

$$U_r \leftrightarrow f\left(z_{r_j} z_{r_i}\right) \tag{19}$$

$$\bigwedge_{z_{r_i}} j \in \langle 1; n\left(Z_{r_j}\right) \rangle \bigwedge_{z_{r_i}} i \in \langle j; \left[\frac{x - \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x + \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + (j - 1) \rangle \rightarrow f\left(z_{r_j} z_{r_i}\right) \tag{20}$$

where 
$$f\left(z_{r_j}z_{r_i}\right) = z_{r_j}z_{r_i}$$
 (21)

— gdzie:

 $\circ$  j — ordinal number of the number  $z_{r_j}$ ,

where 
$$j \in <1; n(Z_{r_j}) > \land j \in \mathbb{C};$$

In this way, we get all the data (values) necessary to calculate the power of prime numbers using the formula 12 - which has its confirmation in the work of the mathematical calculator (EXCEL).

# 2. VERIFICATION OF THE "PRIME" NUMBER $z_r$

The proverbial "icing on the cake" would be the solution to the problem of verifying the number  $z_r$  in terms of its primacy, i.e. whether it is the prime number or the imaginary prime number.

I believe that it is logically possible if we follow the algorithm below - if we compare the cell values of the highest rows of all the columns of the table summary of numbers  $u_r$  with the number x being the right boundary of the whole set of integers numbers:

$$\bigwedge_{z_{r_i}} j \in \langle 1; n\left(Z_{r_j}\right) \rangle \bigvee_{z_{r_i}} i = \left[\frac{x - \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + \left[\frac{x + \left|z_{r_j}\right|}{6\left|z_{r_j}\right|}\right] + (j - 1) \rightarrow f\left(z_{r_j} z_{r_i}\right) \tag{22}$$

$$f\left(z_{r_j}z_{r_i}\right) = z_{r_j}z_{r_i} \tag{23}$$

— where:

— if:

- o  $f\left(z_{r_j}, z_{r_i}\right) < x$  number  $z_r$  is the proper prime number  $p_r$ ; o  $f\left(z_{r_j}, z_{r_i}\right) = x$  number  $z_r$  is the improper prime number  $u_r$ ;

The number of comparisons made in accordance with the above algorithm equals only the harvesting power  $n(Z_{r_i})$ , and its display shows blue ellipses on the table summary of numbers  $u_r$  (Fig. 5.)

#### **PREPARED**

kpt. mgr. inż. Dariusz GOŁOFIT